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EMERSON  ELECTRIC  
VENTILATING *and*  
EXHAUST FANS

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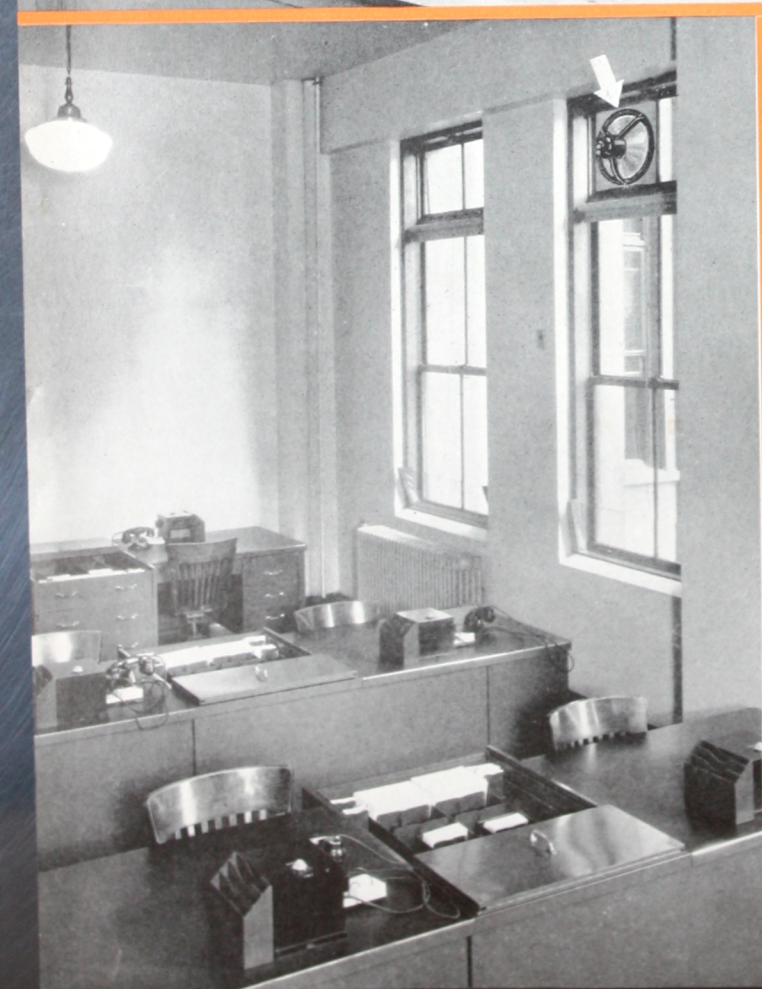
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# People Cannot Live or Work Well Without Fresh, Live Circulating Air

The shock of fresh, cool air which first startles and energizes the diaphragm of a new-born infant symbolizes the need for oxygen which is the breath of life to all living beings.



Since we live by the air we breathe, man has, from time immemorial, attempted to improve the ventilating conditions of the place in which he lives. The cave with the hole near the roof; the Indian teepee with the vent at its top; the adobe hut with a hole cut in its roof; the chimney; the open window; all these are evidence of man's recognition of the need for ventilation and its necessity in proper living.

Such is "natural" ventilation, limited in its effectiveness by the vagaries of the elements. If the wind blows, and from the right direction, and if the rain and snow are prevented from entering, such means of ventilation are satisfactory for normal needs. But wind is far from dependable, as also are rain and snow, creating the need for artificial ventilation.

To this end, and entirely within this century, man has endeavored to supplement "natural" ventilation with mechanical ventilation to accomplish two things: first, to render ventilating systems independent of weather and wind; and, second, to provide greater and more dependable ventilation for the alleviation of abnormal conditions.



All of us recognize that in an enclosed space we should soon exhaust the oxygen in the air and smother for lack of it. What we do not recognize, all too often, is that in offices, stores and rooms of all kinds, we frequently exhaust the oxygen

more rapidly than we replenish it. When this is true, we suffer from a type of suffocation apparent in headaches, stuffiness, and a general sluggishness of physical faculties.

For still another reason it is important to continually refresh the air in a room. Processes—such as cooking, baking, steaming, etc., and utilities, such as stoves, ovens, ranges, heaters, etc., not only drain the oxygen from the air in the room, but produce waste gases which must be carried away lest the air be polluted.

Thus the ventilating problem may be resolved into two parts: first, the introduction of fresh air *into* the room; and, second, the removal of waste gases (including steam, excessive moisture and odors) *from* the room. With exhaust and ventilating fans, this is accomplished by forcibly withdrawing the used air from the room, this suction serving to draw fresh air into the room through doors, windows, etc.



The volume of air so withdrawn and replaced from any room or building is dependent upon the size and capacity of the fan used. Ventilating fans, of moderate capacity are suited particularly for residence ventilating. The larger exhaust fans, with a wide range of capacity, are suited to store, factory and industrial use and for summer cooling of residences after sunset.

Proper ventilation pays dividends many years after its first cost is forgotten. It provides more comfort, increases production, provides more healthful working and living conditions and reduces maintenance costs because of cleaner atmosphere. It is because of these factors that mechanical ventilation is daily increasing in popularity.



## WHERE and HOW to Use EMERSON-ELECTRIC Exhaust Fans

WHERE INSTALLED	USED TO EXHAUST	WHERE INSTALLED	USED TO EXHAUST
<b>AGRICULTURAL:</b> Dairy Barns ..... Dairy Bottling Rooms .....	Odors, Fumes. Stagnant Air, Steam, Odors.	<b>HOTELS:</b> Assembly Rooms—Display Rooms... Kitchens—Dining Rooms..... Tap Rooms and Shops..... Lavatories—Engine Rooms..... Laundry—Large Halls.....	Heat, Steam, Smoke, Odors, Stagnant Air.
<b>APARTMENTS:</b> Engine Rooms ..... Kitchens ..... Large Halls .....	Excessive Heat. Heat, Steam, Odors. Stagnant Air.	<b>INDUSTRIAL:</b> Factories—General: Battery Rooms..... Engine Rooms..... Heat Treating Rooms..... Lavatories..... Work Rooms.....	Poisonous Fumes. Excessive Heat and Steam. Excessive Heat. Bad Air. Dust and Heat.
<b>BAKERIES:</b> Baking Rooms and Sales Room.....	Excessive Heat.	<b>LODGE AND CLUB BUILDINGS:</b> Assembly Rooms—Card Rooms..... Kitchens—Lavatories—Game Rooms..... Gymnasiums.....	Heat, Steam, Smoke, Odors, Stagnant Air.
<b>CHEMICAL PLANTS:</b> Compounding Rooms.....	Fumes, Steam, Excessive Heat.	<b>MEAT PACKING PLANTS:</b> Slaughter and Packing Rooms.....	Heat, Steam and Odors. Stagnant Air, Smoke.
<b>COMMERCIAL LAUNDRIES:</b> Drying Rooms..... Washing and Ironing Rooms.....	Excessive Heat, Steam, Moisture. Distributing Warm Air for Quick Drying.	<b>OFFICES</b> <b>RECREATIONAL PLACES:</b> Assembly Rooms..... Bowling Alleys, Pool Rooms, Dance Halls, Game Rooms—Lavatories.....	Smoke, Stagnant Air, Odors.
<b>EATING PLACES:</b> Cafes, Restaurants, Taverns, Cafeterias: Dining Rooms..... Kitchens—over steam tables..... Tap Rooms.....	Excessive Heat, Steam, Smoke, Cooking Odors.	<b>SCHOOLS:</b> Class Rooms—Assembly Rooms..... Gymnasiums—Lunch Rooms—Lavatories.....	Stagnant Air, also to Control Circulation of Heat.
<b>ENGRAVING, PRINTING AND NEWSPAPER PLANTS:</b> Etching and Electroplating Rooms.....	Injurious Fumes.	<b>THEATRES:</b> Assembly Rooms..... Lavatories..... Projector Rooms.....	Heat, Odors, Stagnant Air.
<b>GARAGES—SERVICE STATIONS:</b> Work and Test Rooms.....	Dangerous and Injurious Fumes (Carbon Monoxide).		
<b>HOMES:</b> Attic Installation.....	Summer Heat.		
<b>HOSPITALS:</b> Kitchens..... Large Halls..... Laundries..... Sterilizing Rooms.....	Steam, Odors, Heat. Stagnant Air. Steam, Excessive Heat. Steam, Odors.		

# EMERSON-ELECTRIC Exhaust Fans

## Two-Speed, Ball-Bearing and Single-Speed Sleeve Bearing Models 12, 16, 18, 24, 30-Inch Sizes

For every ventilating and exhaust problem, where large volumes of air are to be moved, Emerson-Electric Exhaust Fans operate quietly and efficiently. The wide range of five sizes, from 12 to 30-inch blade diameters, with capacities ranging from 850 to 6700 C. F. M., provide the proper volume of air movement for any condition.

Emerson-Electric Exhaust Fans are exceedingly quiet, and are therefore suitable for installation in homes, smart shops, offices and restaurants where blade noise would be objectionable. Rugged construction permits their installation in bakeries, where ovens put forth excessive heat; in laundries, where air is dripping with moisture; in chemical and manufacturing plants, where fumes and smoke render the air unhealthy, or even poisonous; in garages, where the danger of carbon-monoxide gas is ever present; for all these, Emerson-Electric Exhaust Fans are the logical, dependable solution.

### Fully Enclosed Motors

Motors are fully enclosed, protecting the working parts from moisture, dust, grit, grease and fumes. The constant stream of air passing over the motor while it is in operation prevents it from overheating. Each Emerson-Electric Exhaust Fan is individually tested before packing and fully guaranteed for one year against all mechanical and electrical defects.

### Overlapping-Blade Assembly Unusually Quiet in Operation

Designed by Emerson-Electric Engineers after exhaustive tests of all types of blades, the Emerson-Electric Exhaust Fan Blade meets the full requirements of quiet operation and large-volume air delivery. Each fan blade assembly has nine overlapping blades, each of which is matched for weight before assembly and each complete assembly is carefully balanced. The blades are mounted on a large center disk, the latter serving to prevent the flow of reverse air currents near the center of the fan blade assembly. The durable, dark-green finish on the blades may be easily cleaned and will withstand the elements for many years of service.

### Two-Speed Ball-Bearing Fans Designed to Discharge Horizontally, Vertically or at any Angle

Emerson-Electric Ball-Bearing Exhaust Fans may be installed in horizontal or vertical position, or at any angle desired, without injury to the motor or impairing the efficiency of the fan's operation. The motor is equipped with special thrust-type ball-bearings, packed with grease lubricant and sealed against leakage. Lubrication is necessary but once a year and no other attention is required. (Illustrated at lower left)

### Single-Speed Sleeve-Bearing Fans Designed for Horizontal Discharge Only

Emerson-Electric Single-Speed, Sleeve-Bearing Exhaust Fans are intended to be mounted with the motor shaft in horizontal plane. They are recommended for all ventilating problems where fans are to be installed for horizontal discharge and will produce the same satisfactory results on such installations as the ball-bearing types. (Illustrated at lower right)

Emerson-Electric belt-driven Exhaust Fans in 36-inch, 42-inch and 48-inch sizes, with capacities ranging from 8,500 to 16,700 C. F. M. (free air), and accessories are described on pages 10 and 11. Catalog with price information sent on request.

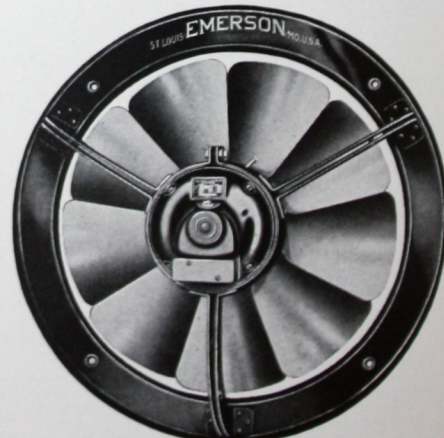


Two-Speed, Ball-Bearing Fan



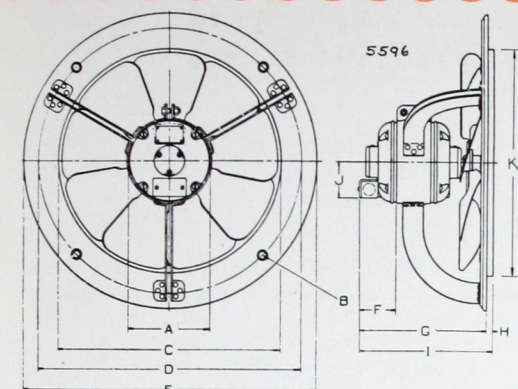
### AUTOMATIC SHUTTER

To automatically close the opening when the exhaust fan is located on an outside wall and not in operation, this automatic shutter will be found very satisfactory. The louvers are made of aluminum, and each shutter is individually hung on corrosion-proof brass pins, to assure continuous service, without attention. The number of leaves varies with the size of the shutter. (See page 5.)



Single-Speed, Sleeve-Bearing Fan

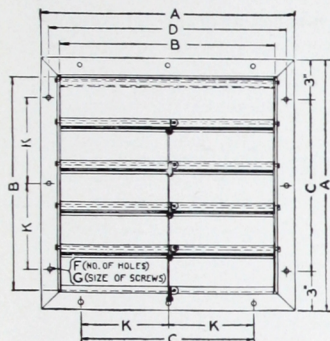
# Dimensions — Performance — Prices



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Dimensions—Exhaust Fans

Size of Fan	Type Bearing	A	B		C	D	E	F	G	H	I	J	K
			No.	Size									
12" A.C.	Ball Bearing	4 1/8"	3	3/8"	12 3/8"	14 1/8"	15 1/8"	4"	9 1/8"	3 1/8"	9 1/8"	2 3/8"	12 1/8"
12" D.C.	Ball Bearing	4 1/8"	3	3/8"	12 3/8"	14 1/8"	15 1/8"	2 7/8"	8 1/8"	3 1/8"	8 1/8"	2 1/8"	12 1/8"
12" A.C.	Sleeve Bearing	4 1/8"	3	3/8"	12 3/8"	14 1/8"	15 1/8"	3 3/8"	9 3/8"	3 3/8"	9 3/8"	2 1/2"	12 1/8"
16" A.C.	Ball Bearing	6 1/8"	4	1/2"	16 1/2"	19 1/2"	21 1/2"	3 1/2"	10 1/2"	1 1/2"	11 1/2"	2 1/2"	16 1/2"
16" D.C.	Ball Bearing	6 1/8"	4	1/2"	16 1/2"	19 1/2"	21 1/2"	3 1/2"	9 1/2"	1 1/2"	10 1/2"	2 1/2"	16 1/2"
16" A.C.	Sleeve Bearing	6 1/8"	4	1/2"	16 1/2"	19 1/2"	21 1/2"	3 1/2"	10 1/2"	1 1/2"	11 1/2"	2 1/2"	16 1/2"
18" A.C.	Ball Bearing	7 1/8"	4	1/2"	18 1/2"	21 1/2"	23 1/2"	3 1/2"	10 1/2"	1 1/2"	11 1/2"	2 1/2"	18 1/2"
18" D.C.	Ball Bearing	7 1/8"	4	1/2"	18 1/2"	21 1/2"	23 1/2"	3 1/2"	10 1/2"	1 1/2"	11 1/2"	2 1/2"	18 1/2"
18" A.C.	Sleeve Bearing	7 1/8"	4	1/2"	18 1/2"	21 1/2"	23 1/2"	3 1/2"	10 1/2"	1 1/2"	11 1/2"	2 1/2"	18 1/2"
24" A.C.	Ball Bearing	8 1/2"	4	1/2"	24 3/4"	28 1/2"	31 1/2"	3 1/2"	13 1/2"	1 1/2"	14 1/2"	3 1/2"	24 3/4"
24" D.C.	Ball Bearing	8 1/2"	4	1/2"	24 3/4"	28 1/2"	31 1/2"	5 1/2"	14 1/2"	1 1/2"	15 1/2"	3 1/2"	24 3/4"
24" A.C.	Sleeve Bearing	8 1/2"	4	1/2"	24 3/4"	28 1/2"	31 1/2"	3 1/2"	13 1/2"	1 1/2"	14 1/2"	3 1/2"	24 3/4"
30" A.C.	Ball Bearing	11 1/4"	4	1/2"	30 3/4"	35 1/2"	39 1/2"	4 1/2"	16 1/2"	1 1/2"	17 1/2"	4 1/2"	30 3/4"
30" D.C.	Ball Bearing	11 1/4"	4	1/2"	30 3/4"	35 1/2"	39 1/2"	6 1/2"	18 1/2"	1 1/2"	19 1/2"	4 1/2"	30 3/4"
30" A.C.	Sleeve Bearing	11 1/4"	4	1/2"	30 3/4"	35 1/2"	39 1/2"	4 3/8"	16 1/2"	1 1/2"	17 3/8"	4 1/2"	30 3/4"



Cut No. 5258

Dimensions and Prices—Automatic Shutters

Fan Size	A	B	C	D	E	F	G	H	J	K	No. of Leaves	Wt. Pkd.	Code-word	List Price
12"	14 3/4"	12"	8 3/4"	13 5/8"	1 3/4"	8"	1 1/4"	3"	1 1/8"	.....	3	6	JURON	\$ 5.75
16"	19 3/4"	16"	13"	17 1/8"	2 1/4"	8"	1 1/4"	3"	1 1/8"	.....	4	10	JUSAN	7.75
18"	21"	18"	15"	19 1/8"	2 1/4"	8"	1 1/4"	3"	1 1/8"	.....	5	12	JUSEG	9.50
24"	27"	24"	21"	25 1/8"	2 1/4"	12"	1 1/4"	3"	1 1/8"	10 1/2"	6	16	JUSIH	13.50
30"	33"	30"	27"	31 1/2"	2 1/4"	12"	1 1/4"	3"	1 1/8"	13 1/2"	7	22	JUSOX	21.50

Dimensions and Prices—Protective Mesh Guards

Size of Fan	Guard for Motor Side of Fan					Guard for Discharge Side of Fan					
	Dimensions			Code Word	List Price Each	Dimensions			No. of Mounting Holes	Code Word	List Price Each
	A	B	C			D	E	F			
12"	15 5/8"	5"	5 3/8"	JOMAS	\$ 6.35	14 1/2"	13 3/8"	1 3/8"	3	JOGAL	\$ 2.55
16"	21 1/4"	6"	7 1/8"	JOMET	7.50	19 1/2"	17 3/8"	1 3/8"	4	JOGEM	3.75
18"	23 1/4"	7"	7 1/8"	JOMIV	8.15	21 3/2"	19 3/8"	1 3/8"	4	JOGIN	4.40
24"	30 3/4"	8 1/4"	9 13/16"	JOMOW	12.05	28 1/2"	25 3/8"	2 1/4"	4	JOGUR	5.85
30"	38 1/8"	12"	10 11/16"	JOMUX	15.45	35 1/2"	31 3/8"	2 3/8"	4	JOGOP	7.70

Prices and Data—Exhaust Fans—Performance Under Free-Air Delivery Conditions. One-Year Guarantee.

## Ball-Bearing Exhaust Fans

TWO-SPEED—FOR 115 VOLTS, 60 CYCLES, SINGLE PHASE—220 VOLT FURNISHED AT SAME PRICES

Size Fan	H. P.	High Speed					Low Speed					Weight		Type No.	Codeword	List Price
		Watts	Amps.	R.P.M.	C.F.M.	C.F.H.	Watts	Amps.	R.P.M.	C.F.M.	C.F.H.	Net	Pkd.			
12"	1/50	70	1.1	1140	850	51,000	60	.80	860	725	43,500	21	28	S40SM	LAFIH	\$41.00
16"	1/20	135	2.5	1140	1500	90,000	110	1.9	860	1125	67,500	47	59	S50SG	LECEP	57.50
18"	1/8	165	3.3	1140	2350	141,000	105	2.0	860	1750	105,000	55	71	S60ST	LEDOT	80.00
24"	1/6	280	5.6	860	4000	240,000	200	4.3	570	2700	162,000	112	149	S70SG	LEFAR	134.00
30"	1/3	430	8.2	685	6700	402,000	355	8.0	570	5600	336,000	218	272	S95SD	LEFOV	175.00

SINGLE-SPEED—FOR 220 VOLTS, 60 CYCLES, THREE PHASE

18"	1/8	175	1.0	1140	2350	141,000	Variable speed operation obtained by use of 3-speed control units.	55	70	P60SF	LEGET	85.00
24"	1/6	230	1.6	860	4000	240,000		112	150	P70SC	LEHUY	110.00
30"	1/3	355	2.5	685	6700	402,000		218	263	P95SF	LIBOC	131.50

SINGLE-SPEED—FOR 115 VOLTS DIRECT CURRENT (SERIES WINDING)—230 VOLT FURNISHED AT SAME PRICES

12"	1/30	40	.35	1140	850	51,000	Variable speed operation obtained by use of speed regulator in series with motor — 50% reduction obtained.	18	23	D47SI	IGJOB	39.00
16"	1/20	80	.70	1140	1500	90,000		43	53	D59SD	IGDAS	50.00
18"	1/8	127	1.1	1140	2350	141,000		52	67	D68SF	IGDOW	72.00
24"	1/6	242	2.1	860	4000	240,000		110	147	D85SD	IGMEC	140.00
30"	1/3	392	3.4	685	6700	402,000		215	260	D11SE	IGLEB	168.00

## Sleeve-Bearing Exhaust Fans

SINGLE-SPEED—FOR 115 VOLTS, 60 CYCLES, SINGLE PHASE

12"	1/50	52	1.1	1140	850	51,000	Single Speed	18	28	S40SY	BABOZ	31.50
16"	1/20	77	1.4	1140	1500	90,000	Single Speed	34	58	S50SQ	BACOB	44.00
18"	1/8	170	3.2	1140	2350	141,000	Single Speed	43	71	S60WJ	BADIB	60.00
24"	1/6	250	5.6	860	4000	240,000	Single Speed	89	155	S70SH	BAFEB	99.00
30"	1/3	385	7.6	685	6700	402,000	Single Speed	167	260	S95SE	BAHEH	151.00

Single-phase and three-phase 60-cycle fans, also 115 and 230 volt direct current, are regularly carried in stock at St. Louis, New York City and Chicago and by conveniently located wholesalers.

C.F.M.—Cubic feet of air per minute. C.F.H.—Cubic feet of air per hour.

Speed regulators not required or regularly furnished with three-phase or direct-current fans. Two-speed single-phase fans furnished with 2-speed snap switch. One-year guarantee against electrical or mechanical defects. Prices and data subject to change.

# How to Determine the Sizes of EMERSON-ELECTRIC Exhaust Fans for Free-Air Installations

To determine the proper size of exhaust fan equipment to be installed in any location, two factors must be considered:

1. Size (in cubic feet) of room, store or other space to be ventilated.
2. Number of times per hour the air in this space should be changed.

When the number of cubic feet of air in the space to be ventilated has been determined, multiply that by the number of times per hour the air is to be changed. (See Table below for recommended changes per hour for various types of buildings or rooms). The resulting figure shows the amount of air to be removed per hour.

From this may be determined the size of the exhaust fan or number of exhaust fans needed. The sizes of exhaust fans and air-moving capacities of each are shown in the table below.

For example:

**Problem:** Kitchen, 18 feet wide, 20 feet long and 10 feet from floor to ceiling.

$$18 \times 20' = 360 \text{ sq. ft. floor area}$$

$$360 \times 10 = 3600 \text{ cubic feet total content}$$

$$3600 \times 15 \text{ changes per hour} = 54,000 \text{ cubic feet of air per hour that must be removed.}$$

In the table below you will find that a 16-inch exhaust fan has a free-air capacity of 1500 C. F. M. x 60 (minutes per hour) or 90,000 cubic feet per hour, which will adequately handle the requirements of such an installation with ample allowance for resistance to the air movement as found in the average installation.

Best results are obtained by installing exhaust fans for discharge of the air with, rather than against prevailing winds.

**Emerson-Electric Exhaust Fan \*Performance in FREE Air**

Size Fan	*SPEEDS	R. P. M.	C. F. M. Free Air
12"	High	1140	850
	Low	860	725
16"	High	1140	1500
	Low	860	1125
18"	High	1140	2350
	Low	860	1750
24"	High	860	4000
	Low	570	2700
30"	High	685	6700
	Low	570	5600

R. P. M.—Revolutions per minute.

C. F. M.—Cubic feet per minute.

\*Performance is shown for two-speed fans. For performance of single-speed fans use "High" Speed information.

In places where odors, steam, smoke or excessive heat are present, the exhaust fan should be placed near the ceiling. In kitchens, the fans should be placed directly above or near the stove and as close to the ceiling as possible. This will prevent the circulation of smoke, steam and odors to other parts of the room and to other rooms of the building. Install exhaust fans directly in the outside wall or upper part of a window.

In garages, chemical plants, and similar locations where escaping gases or fumes are heavier than air, and tend to fall toward the floor, the exhaust fan should be located as near to the floor as possible. For such installations, safety requires the use of wire mesh guards to prevent injury from accidental contact with the blades of the fan. (Guards are listed on page 5).

## Consult Emerson-Electric Engineers

For help on any exhaust or ventilating problem, feel free to consult Emerson-Electric Engineers whose many years of experience will be available to you without cost. Send requests to The Emerson Electric Manufacturing Co., St. Louis, Mo. Make a rough sketch of the floor plan and be sure to include the following information:

1. Room size—width, length, height.
2. Mark window and door locations and indicate sizes.
3. Indicate position of building in relation to points of the compass.
4. Indicate adjacent buildings, alleys and streets.
5. Give the direction of prevailing winds, from \_\_\_\_\_ to \_\_\_\_\_.
6. State purpose for which room is to be used.
7. State the number of persons normally occupying the room.

**Table Showing Air Changes Recommended by Emerson-Electric Engineers**

Type of Building or Room	Required Changes per Hour
Club rooms, billiard and card rooms . . . . .	6 - 8
Dining rooms . . . . .	2 - 3
Sleeping quarters . . . . .	1 - 2
Offices, banks, drug, grocery and barber shops . . . . .	4 - 6
Smoking rooms and bowling alleys . . . . .	8-10
Public lavatories . . . . .	18-25
Garages and laundries . . . . .	10-15
Restaurants . . . . .	10-14
Kitchens . . . . .	12-15
Markets . . . . .	8-12

# How to Install EMERSON-ELECTRIC Exhaust Fans for Free-Air Movement to Obtain Maximum Results

## Importance of Location and Size of Air Inlet Openings

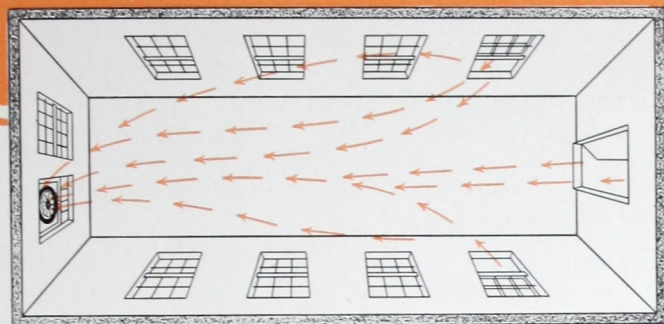


Figure 1

Because an exhaust fan draws air from a room, thereby creating a partial vacuum, it is highly important that the air inlets to the room be properly located, of at least the same area as the area of the opening through which the fan discharges and as much larger as possible. These inlets (doors and windows) should be opened on the wall opposite the exhaust fan. This will permit the fresh air to pass through the entire length of the room before reaching the fan, assuring thorough ventilation. This is illustrated in Figure 1.

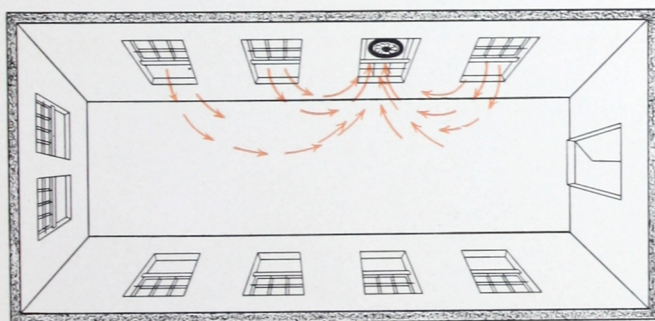


Figure 2

Incorrect method is shown in Figure 2. When open windows or doors are on the same wall as, or close to the exhaust fan, the room will not be properly ventilated, although the fan is discharging its rated capacity of air. Under such conditions the air short-circuits by coming in through the nearest opening and traversing only that portion of the room between the opening and the fan.

Control of ventilation is largely a matter of proper location of inlet openings. If *all openings* are located in the wall opposite the fan *all the air* removed by the fan will travel the entire distance between inlets and outlet. However if ventilation is desired in a corner to the right or left of the fan it is only necessary to provide an inlet opening in such space and of such size as to permit the desired portion of the fan capacity to be drawn in at that point. Care should be exercised, however, to limit the opening to the

smallest possible size to avoid short circuiting the general movement of air from the opposite ends of the room. This is illustrated by Figure 3.

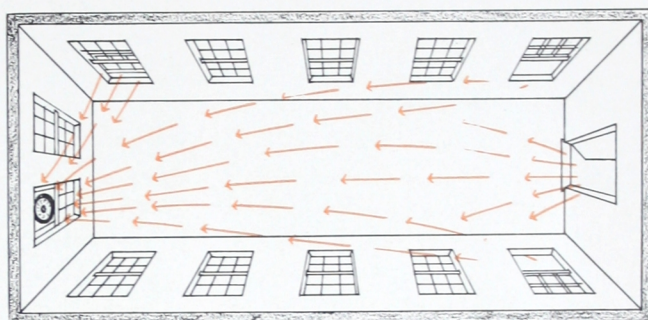


Figure 3

In wide buildings it will often be found advisable to install two or more smaller fans in preference to one large one. These should be located to move the air in the same general direction to avoid cross currents and consequent loss of efficiency. This is illustrated in Figure 4.

When exhaust fans are used principally to dispel heat or odors emanating from some particular piece of equipment or process they should be located as close to the source as possible.

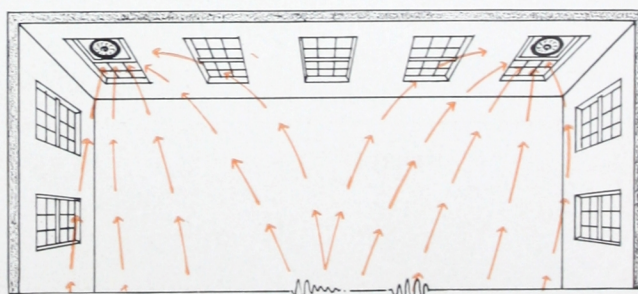


Figure 4

Emerson-Electric two-speed fans will be found most suitable in the majority of installations as the speed regulation feature permits the owner to regulate the amount of ventilation according to varying requirements.

In selecting fan equipment it is always advisable to install a fan or fans with sufficiently large capacity to handle the task with ease. Excess capacity is an advantage. Insufficient capacity defeats the whole purpose of the installation.



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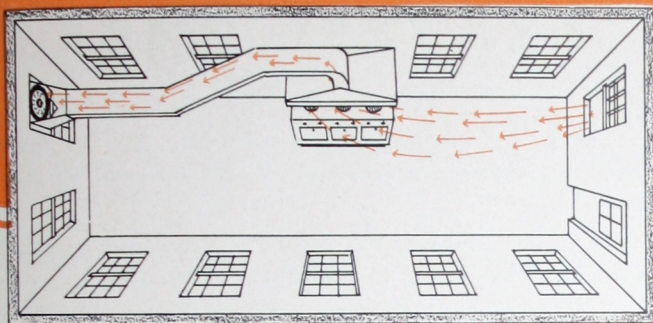
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# How to Select and Install EMERSON-ELECTRIC Exhaust Fans With Ducts....



Where ducts must be used they should be as short and direct as possible, as each bend and elbow increases the resistance and reduces the fan's efficiency. Ducts should be of ample size, preferably round and not smaller than diameter of the fan. If rectangular, they should be as nearly square as possible and have 40% to 50% greater area than the area of a circle of the same diameter as the fan used.

Always install the exhaust fan at the discharge end of a duct. Air turbulence will add materially to the noise and will reduce the air delivery when the fan is mounted on the intake end discharging into the duct.

Static pressure is the measure of resistance to the flow of air through a duct, caused by friction of the moving air against the surface of the duct. Static pressure increases with the velocity of the air, consequently duct area should be as liberal as possible. Air deliveries given for low-speed operation in the table at the bottom of page do not represent air deliveries against static pressures given in the heading of the table, since the pressure is less at low speed, but do represent the delivery at low speed under conditions where the high-speed pressure is as shown.

For example, a 24" exhaust fan operating at 860 r. p. m. (high speed) against .1" static pressure delivers 3600 C. F. M. On low speed, at 570 r. p. m. under the same conditions, the static pressure drops to approximately .044" and air delivery is 2500 C. F. M. against the reduced pressure.

## How to Calculate Size Fan Required

For a room 45' x 29' x 10' (contents 13,050 cu. ft.) to provide 10 air changes per hour through a duct 10' long with one 90° elbow:

$$10 \times 13,050 \text{ cu. ft.} = 130,500 \text{ cu. ft. per hour}$$

10' of round duct offers approximately .015" resistance

1 — 90° elbow offers approximately .020" "

Total resistance approximately .035" "

$$130,500 \div 60 = 2175 \text{ cu. ft. per minute}$$

Refer to table on this page and you will find that on high speed the 18" fan delivers 2150 C. F. M. against .05" static pressure. On low speed it will deliver 1650 C. F. M. or approximately 7½ air changes per hour.

As shown in the table below, this 18" fan may be installed with 18" diameter round duct or with a rectangular duct size 18" x 20".

Exhaust Fan Size	Resistance for 10' lengths of round ducts	Round Duct Size (Diameter)	Equivalent Rectangular Duct Size	Rectangular Duct Area
12"	.015"	12"	= 12"x13"	156 sq. inches
16"	.015"	16"	= 16"x18"	288 sq. inches
18"	.015"	18"	= 18"x20"	360 sq. inches
24"	.015"	24"	= 24"x37"	888 sq. inches
30"	.015"	30"	= 30"x46"	1380 sq. inches

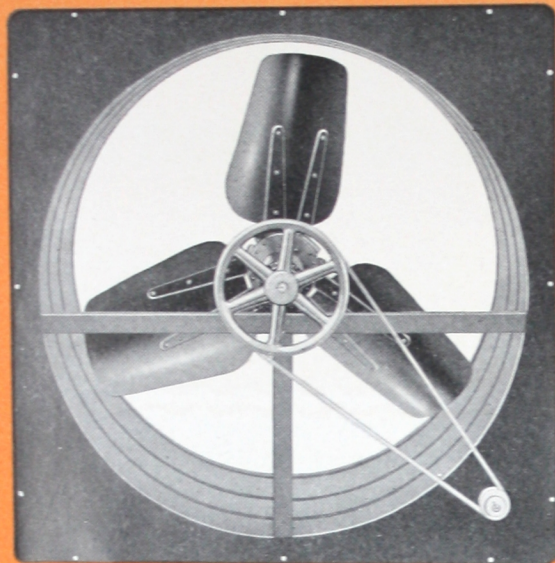
Each 90° elbow offers approximately .02" additional resistance.

## Performance of Emerson-Electric Exhaust Fans Against Static Pressures

Size Fan	*Speeds	RPM	CFM Under Static Pressure (Inches of Water)									
			.05	.1	.15	.2	.25	.3	.35	.4	.45	.5
12"	High	1140	700	500	300							
	Low	860	525	375	230							
16"	High	1140	1350	1150	925	670	400					
	Low	860	1050	875	700	500	300					
18"	High	1140	2150	2000	1750	1550	1200	700	400			
	Low	860	1650	1500	1300	1150	900	570	300			
24"	High	860	3800	3600	3300	3000	2700	2300	2000	1500	900	400
	Low	570	2550	2500	2200	2000	1800	1500	1300	1000	650	250
30"	High	685	6200	5740	5240	4800	4350	3860	3360	2700	2200	1500
	Low	570	5180	4750	4350	4000	3620	3200	2780	2300	1820	1240

CFM—Cubic feet of air per minute.  
RPM—Speed of fan in revolutions per minute.  
\*Performance is shown for two-speed fans. For performance of single-speed fans use "High" Speed information.

# EMERSON - ELECTRIC BELT - DRIVEN Exhaust Fans



A practically unlimited variety of applications in industrial, commercial and institutional buildings has been developed for these powerful fans.

They are used in Foundries to exhaust excessive heat, gases and smokes; in Variety Stores, Auto-Sales Rooms, Mortuaries, Laboratories, Bakeries, and numerous other types of buildings to provide cool comfort for employees and patrons.

Note the several different methods of installation on these pages. Some fans are mounted in window openings, others in wall openings with automatic shutters, others in pent house arrangements, others in plenum chambers with fixed louver openings in the walls for venting the air.

With fan capacities ranging from 8,500 to 16,700 C. F. M. it is a simple matter to provide the correct size fan or multiple units for any given requirements, from the average size store to the huge industrial plant.

Mounting accessories include plenum chambers, automatic wall-type shutters and automatic ceiling shutters, for all three sizes of fans.

Emerson-Electric Engineers will gladly cooperate in preparing fan specifications to overcome any bad-air condition. Merely furnish a rough layout of the area giving important details, such as measurements, location of openings, direction of prevailing winds, purpose for which used and number of people normally occupying the area.

## Concise Picture Facts

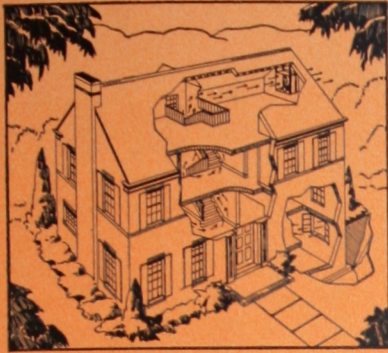
1. Auto Sales room has 2—36-inch fans installed over show window. Single-story, flat roof building, formerly very hot in summer.
2. Variety Store has 42-inch fan installed in back of store pulling air from front door and transom.
3. Large foundry has 8—42-inch fans installed in Pent Houses on the roof.
4. A modern bakery uses 2—42-inch fans installed in uniquely built pent houses on the roof, the pivoted doors are controlled manually. Note the reserve spaces should additional fans be desired later.
5. A modern laboratory building installs 2—48-inch fans with plenum chambers in attic. Note ceiling shutters in second floor ceiling. Air is forced out through fixed louvers on all four sides of the attic.

Page 10



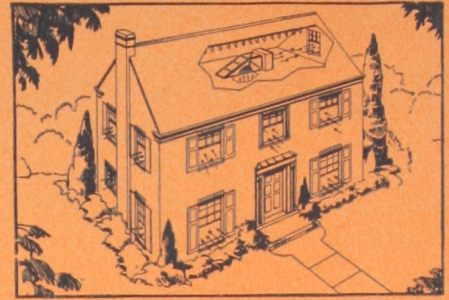
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# Attic Installations in Homes



Installation of fan at wall opening. Air drawn up through stair well to third floor.

Emerson-Electric belted exhaust fans are also used to bring cool night breezes into the home through open windows and doors. This natural cool air, passing over the body, keeps the skin free of uncomfortable perspiration, permits the occupants to sleep soundly and pleasantly, to enjoy indoor recreation in cool comfort, and provides the same comfort in the home as an evening drive into the country (in an automobile). One of the outstanding features of the Emerson-Electric System of Home Cooling, by air circulation and ventilation, is its great flexibility. The number of air changes in any part of the house can easily be regulated by opening the windows in the rooms where cooling is desired and closing the windows in other parts of the house. The size of the home, and the size of the fan selected determines the number of rooms which may be cooled adequately, at one and the same time.



Installation of fan with plenum chamber. Air drawn through automatic shutter in second floor ceiling.

Emerson-Electric belted Exhaust Fans are powered with specially engineered capacitor-start, induction-run motors. They start the fan without stress or strain, and come up to speed quickly. The motors have a resilient, rubber hub-mounting arrangement for insulating motor operation noises from the housing and they also have in-built, thermal-overload protectors. This protector automatically prevents injury to the motor due to overloading from any cause such as low voltage or a tight belt. The protector resets itself after the windings have cooled.

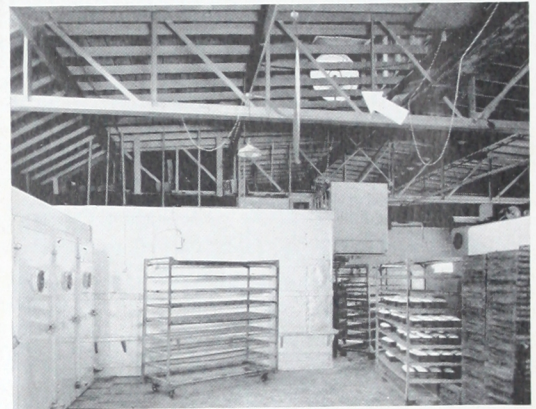
As may be seen, the motor is outside of the air stream and easily accessible for servicing without entering or disturbing the plenum chamber, when the fan is used in such an installation. Belt tension may be increased or decreased by merely adjusting the position of the motor forward or backward on the slotted base. Each motor is equipped with outlet box for connection of rigid or flexible conduit.

The specially designed fan shaft is another very important and distinctive feature and one which adds years of service to these Emerson-Electric Exhaust Fans. The shaft operates on grease-packed, thrust-type ball bearings, and the entire assembly is resilient (rubber), hub-mounted, similar to the motor mounting. The bearings have sufficient lubricant for approximately 6000 hours operation, or three average seasons, before relubrication is necessary.

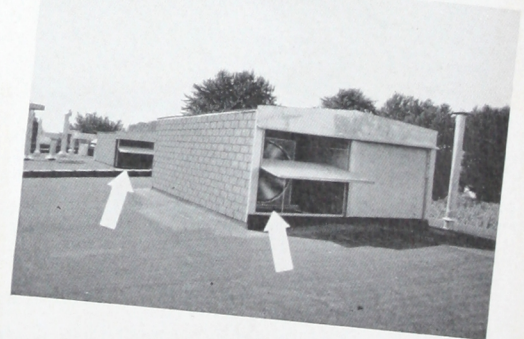
Special attention is given to balancing the blades to assure easy starting and smooth vibration-free operation. Both pulley and blade are securely mounted on the shaft with keyways and set screws. The fan housing has mounting holes drilled in the face to facilitate mounting at wall opening. Motor location and mounting simplifies servicing and the ball-bearing fan shaft permits continuous operation without undue wear and with only infrequent maintenance and lubrication.

**Complete performance information, specifications and list prices on Emerson-Electric Belt-driven Exhaust Fans are contained in separate catalog—available on request.**

The illustrations below show the installation of two 48-inch fans in the attic of a large building used for laboratory purposes. The air is drawn up from the first floor, through stair wells on opposite ends of the building, and into the attic through automatic shutters located in the ceiling of the third floor. The air is exhausted from the attic through fixed louvers in the four outside walls of the attic.

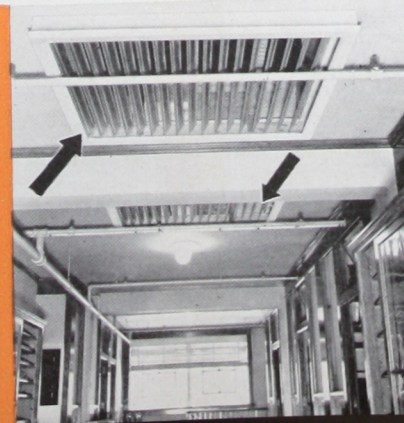
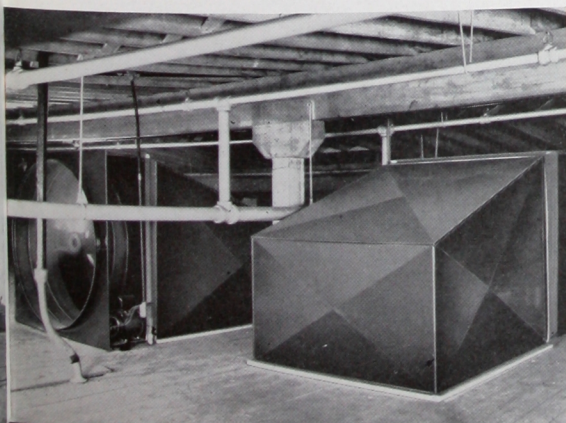


4



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Page 11



# EMERSON-ELECTRIC Ventilating FANS for Kitchens, Bathrooms and Every Residential Requirement . . . . .

A ventilating fan is a necessity in the modern kitchen. It exhausts cooking odors, steam and excessive heat, and prevents cooking odors from spreading to other rooms in the home.

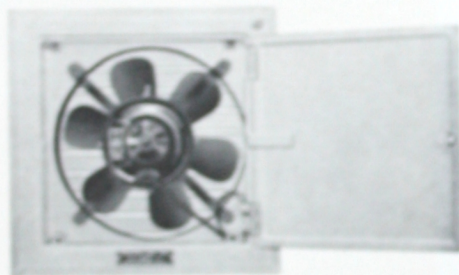
Emerson-Electric 9-inch and 12-inch Ventilating Fans are made for permanent installation in telescoping wall boxes of welded construction, and for convenient installation in adjustable metal panels for window or transom.

These fans are electrically reversible by a flick of a switch, for exhausting hot kitchen air or for bringing in cool outside air. The automatic jamb switch is turned on when the door is opened, turned off when the door is closed. A convenient handle is furnished for opening and closing the door and which also may be used for operating the reversing switch on motor.

## A Variety of Sizes to Suit Every Need

In 9, 12 and 16-inch sizes, Emerson-Electric Ventilating Fans provide a complete range for practically every type of installation requirement. Wall boxes are furnished for 9 and 12-inch sizes and adjustable mounting panels to fit window or transom are furnished in three sizes, to fit windows or transoms from 26 to 46 inches wide.

The 16-inch Emerson-Electric Ventilating Fan is designed for exhaust duty only and is ideally suited for small restaurant kitchens, shops, offices, lavatories, etc. It has a fully-enclosed, dust-proof, capacitor-type motor of high efficiency. Sponge-rubber bushings on all sizes assure vibrationless operation. Liberal-sized bronze bearings are grooved to distribute the oil evenly. May be used with automatic shutters shown on page 4.



Doors open from the left-hand side (as shown)—may be reversed by turning the inner section of the wall box at time of installation, to provide for opening from the right. Approved by Underwriters.



Exterior view showing louvers and interior view with door closed.

## Wall Boxes for Built-In Installations

For permanent installation, Emerson-Electric all-steel wall boxes are easily installed in new homes at the time of construction or may be readily installed in homes already built. The telescoping wall box is adjustable to the thickness of the wall and for unusually thick walls long threaded studs can be furnished in place of those normally packed with the wall box.

The outer section of the wall box has permanent louvers, protecting the fan from the elements. The inner section is equipped with a tightly fitting door, preventing cold air from entering the room when the fan is not in operation. Opening the door starts the fan in operation and closing it stops the fan.

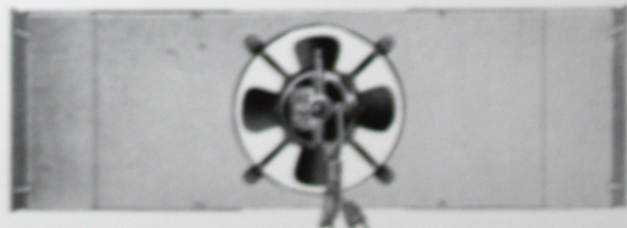
## Ventilating Panels for Window or Transom Installation

Adjustable, steel mounting panels are easily installed in windows or transoms and do not interfere with the raising and lowering of the sash. Mounting panels are an inexpensive and effective way of securing proper ventilation and particularly suitable for

apartments or homes which are rented and in which the tenant wishes to own a unit which is portable.

A screw driver is the only tool required for its installation. The panel can be located in either the top or bottom portion of the window, or in door transom.

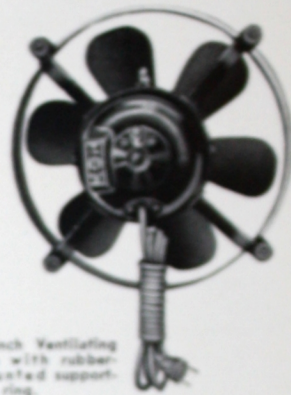
All Emerson-Electric wall boxes and adjustable mounting panels are finished in washable French Gray lacquer.



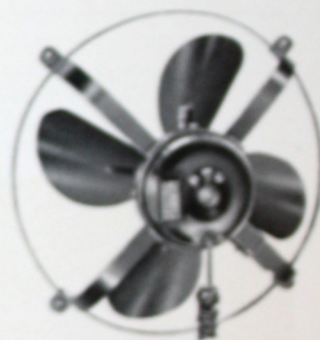
Illustrating the typical adjustable ventilating panel with Emerson-Electric 9-inch Reversible Ventilating Fan for windows and transoms. Approved by Underwriters.



9-inch Emerson-Electric Ventilating Fan with rubber-mounted supporting ring.



12-inch Ventilating Fan with rubber-mounted supporting ring.



16-inch Ventilating Fan, non-reversible, with rubber-mounted supporting ring.

# Methods of Installing EMERSON-ELECTRIC Kitchen Ventilating Fans . . .



Satisfaction is best obtained from a kitchen ventilating fan when it is properly installed. The fan should be installed in the outside wall directly above the stove, or as near to it as possible, and close to the ceiling. In this way heat, steam and cooking odors will be removed near their source and will not become distributed through the house.

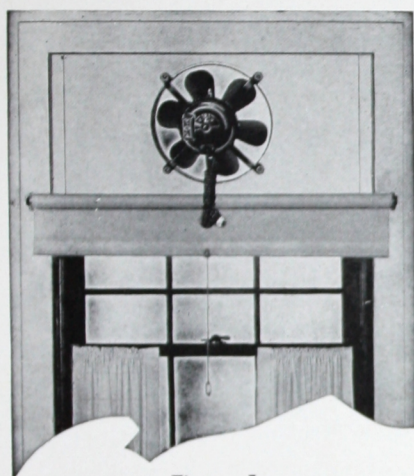


Figure A

Some suggested methods of installing Emerson-Electric Ventilating Fans are illustrated on this page. In Figure A, an adjustable mounting panel is fitted to the top of a window, from which the heat, steam and cooking odors are exhausted or cool air is brought in. Figure B shows an adjustable mounting panel installed in a door transom where, when the transom sash is opened, the fan exhausts the air from the kitchen or, as reversed, brings in cool air from the outside.

Figure C shows the ventilating fan in wall box installed in cornice, between kitchen cabinets, which has the wall box door installed in its bottom surface through which the steam, heat and cooking odors are drawn.

Figure D likewise shows a hidden installation. Here the fan and wall box are installed just above the ceiling line between rafters and by the use of a short duct and with the wall box door in the ceiling it draws the heat, steam and cooking odors out through the ceiling.

Figure E shows the method of installing a ventilating fan and wall box in a wide cornice. The wall box is built into the wall, directly above the stove or as close to it as the building's construction will permit. A short duct connects the inside door section and the outer fan section with louvre. For direct action, both in exhausting air and for bringing fresh air into the room, this method is superior to those shown in Figures C and D.

Page 15 illustrates three general methods of installing wall box fans where ducts are not necessary.

As in the case of exhaust fans it is important to provide air inlets on the opposite side of room from the fan. A door or window should be left open whenever the fan is operating, to provide the supply of fresh air to replace that which the fan is removing.



Figure B

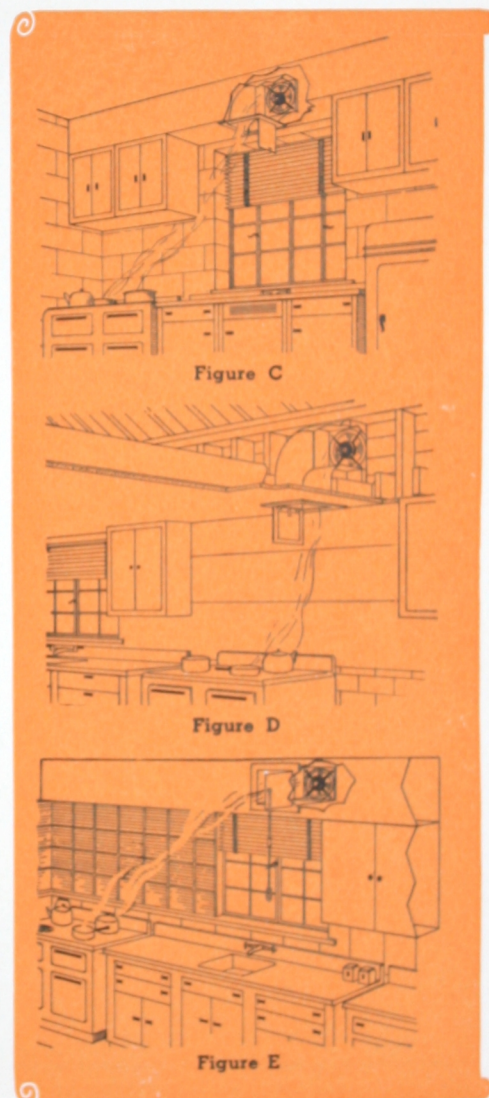


Figure C

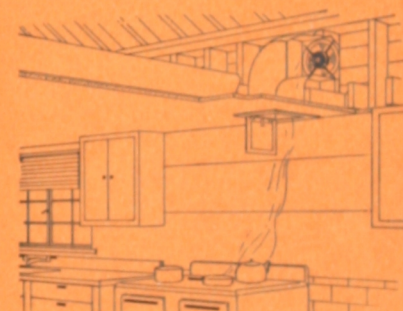


Figure D

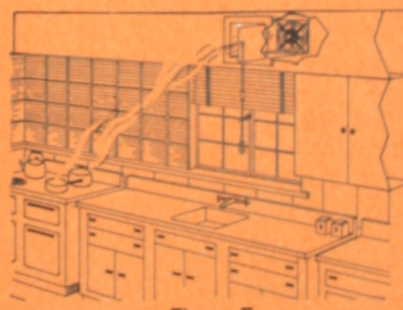


Figure E

## How to Select Proper Size Ventilating Equipment

Determine the cubical contents of the room or other space to be ventilated (width x length x height). Multiply this figure by the number of air changes per hour needed to get total air-movement required. Select size fan which will move that volume of air from table on page 14. The table at right gives the number of air changes per hour which Emerson-Electric ventilating engineers recommend for certain types of service. For installations requiring greater air delivery than provided by these ventilating fans install Emerson-Electric Exhaust Fans—available in sizes 12-16-18-24 and 30-inch—fully described in this catalog.

## Types of Rooms and Buildings

DESCRIPTION	Required Changes per Hour
Club rooms, billiard and card rooms . . . . .	6 - 8
Dining rooms . . . . .	2 - 3
Sleeping quarters . . . . .	1 - 2
Offices, banks, drug, grocery and barber shops . . . . .	4 - 6
Smoking rooms and bowling alleys . . . . .	8-10
Public lavatories . . . . .	18-25
Garages and laundries . . . . .	10-15
Restaurants . . . . .	10-14
Kitchens . . . . .	12-15
Markets . . . . .	8-12

# Performance — Prices — Dimensions EMERSON-ELECTRIC Ventilating Fans

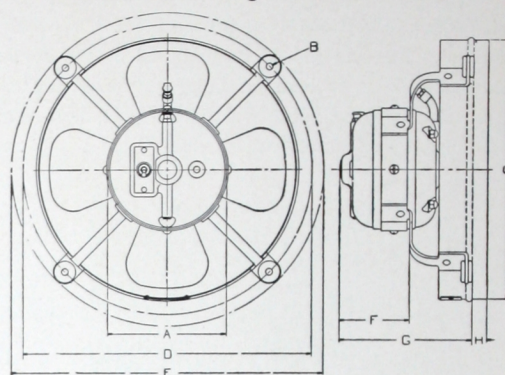
Quiet and efficient in operation, with fully-enclosed, dust-proof motors, Emerson-Electric Kitchen Ventilating Fans are guaranteed against mechanical or electrical defects for one year.

They are easily cared for, requiring re-lubrication only once a year, and lubricating points are easily reached without dismantling or removing the fan from the wall-box or mounting panel.

## Dimensions of 9, 12 and 16-inch Ventilating Fans

Type No.	Size	A	B		C	D	E	F	G	H	No. Blades
			No.	Size							
2345	9"	4 $\frac{1}{2}$ "	4	$\frac{1}{4}$ "	9 $\frac{13}{16}$ "	11"	11 $\frac{7}{8}$ "	2 $\frac{21}{32}$ "	5 $\frac{1}{16}$ "	1 $\frac{3}{32}$ "	4
2345-AA											
59666	12"	5 $\frac{1}{8}$ "	4	$\frac{5}{16}$ "	12 $\frac{1}{16}$ "	14 $\frac{1}{8}$ "	15 $\frac{1}{8}$ "	3 $\frac{11}{32}$ "	6 $\frac{21}{32}$ "	1 $\frac{5}{16}$ "	6
59666-AA											
58648	16"	5 $\frac{1}{16}$ "	4	$\frac{1}{4}$ "	17 $\frac{3}{16}$ "	18 $\frac{1}{16}$ "	19 $\frac{7}{16}$ "	3 $\frac{11}{32}$ "	8 $\frac{5}{32}$ "	—	4

Dimension Diagram (See Table)

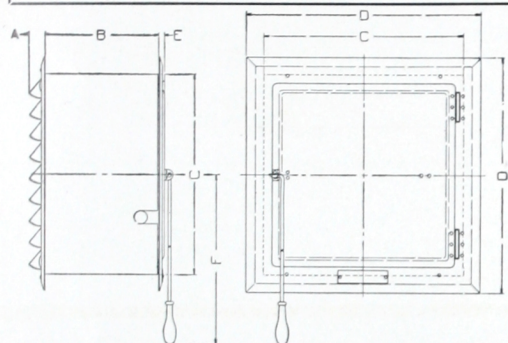


## Dimensions of Wall Boxes

Fan Size	A	*B	C	D	E	F
9"—2345-AA	1 $\frac{1}{8}$ "	8" to 14"	11 $\frac{1}{16}$ "	13 $\frac{1}{2}$ "	$\frac{3}{8}$ "	27 $\frac{3}{4}$ "
12"—59666-AA	1 $\frac{1}{8}$ "	8" to 15"	14 $\frac{1}{16}$ "	16 $\frac{1}{2}$ "	$\frac{3}{8}$ "	27 $\frac{3}{4}$ "

## Dimensions of Mounting Panels

For Fan Size — Type	Height of Panel	Adjustable Width
9"—2345	11 $\frac{1}{8}$ "	26" to 38"
12"—59666	14 $\frac{1}{4}$ "	27" to 37"
12"—59666	14 $\frac{1}{4}$ "	36" to 46"



## Emerson-Electric Ventilating Fans Only, With Mounting Supports—One-Year Guarantee

Size	Volts	Current	Speeds and Watts		Approx. +CFM Free Air	Approx. ★CFH Free Air	Weight		Type No.	Code Word	List Price Each		
							Net	Pkd.					
#Fans for Use with Window Panels													
9"	115	60 cy.	1575 rpm	45 watts	Reversible Operation {	600	36,000	9	13	2345	SAFOC SAGEB	\$14.50	
12"	115	60 cy.	1050 rpm	65 watts		1050	63,000	16	27	59666		25.00	
•Fans for Use with Wall Boxes													
9"	115	60 cy.	1575 rpm	45 watts	Reversible Operation {	600	36,000	9	13	2345-AA	SAHAB SALUK	14.50	
12"	115	60 cy.	1050 rpm	65 watts		1050	63,000	16	27	59666-AA		25.00	
†Fan for Direct Mounting (Wall Boxes or Panels not available for this type)													
16"	115	60 cy.	1550 rpm	72 watts	Non-reversible Operation		1600	96,000	20	28	58648	SAFUD	28.00

#Fans approved by Underwriters for use with window panels. Rubber covered cord and soft rubber plug attached.

•Fans approved by Underwriters for use with wall boxes. Two conductor rubber covered cord extends 15 inches from insulating bushing in motor for connection in outlet box in the wall box.

†Fan approved by Underwriters. Outlet box attached to motor. Two rubber covered leads extend 12 inches from insulating motor bushing to facilitate making connections in outlet box.

+CFM—Cubic feet of air per minute. ★CFH—Cubic feet of air per hour.

Fans listed for 115 volts are satisfactory for use on 10% above or below rated voltage. 12 and 16-inch fans can be furnished for 220 volts, 60 cycles.

Supports and motor body are finished in black, blades of fans in black lacquer. Furnished complete with plug and cord, ready for installation.

## Adjustable Window Panels for Ventilating Fans

Size	Description	Pkd. Weight		Code Word	List Price Each	Panels With Fans	
						Code Word	List Price Each
For 9" Vent. Fan	All Metal, Adjustable to Windows, 26" to 38"	12	Panel Prices Do Not Include Fans	JEZAD	\$4.00	AKAWD	\$18.50
For 12" Vent. Fan	All Metal, Adjustable to Windows, 27" to 37"	13		JETOB	5.00	AKBOH	30.00
For 12" Vent. Fan	All Metal, Adjustable to Windows, 36" to 46"	18		JEROY	7.00	AKLEP	32.00

Panels are drilled with all necessary holes for mounting, and are furnished complete with bolts, washers, nuts and screws.

## Adjustable Wall Boxes for Ventilating Fans

Size	Description	Pkd. Weight		Code Word	List Price Each	Wall Boxes With Fans	
						Code Word	List Price Each
For 9" Vent. Fan	*Adjustable to Wall Thickness 8" to 14"	24	Wall Box Prices Do Not Include Fans	AGAPL	\$14.50	AMGAR	\$29.00
For 12" Vent. Fan	*Adjustable to Wall Thickness 8" to 15"	34		AGBET	18.50	AMGES	43.50

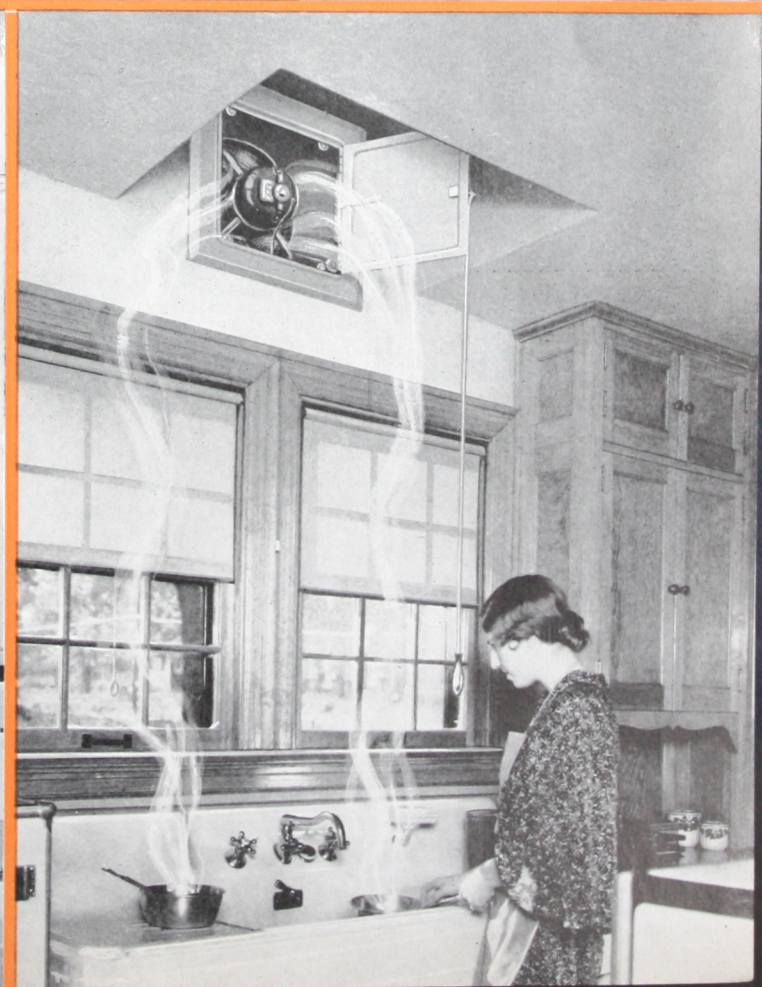
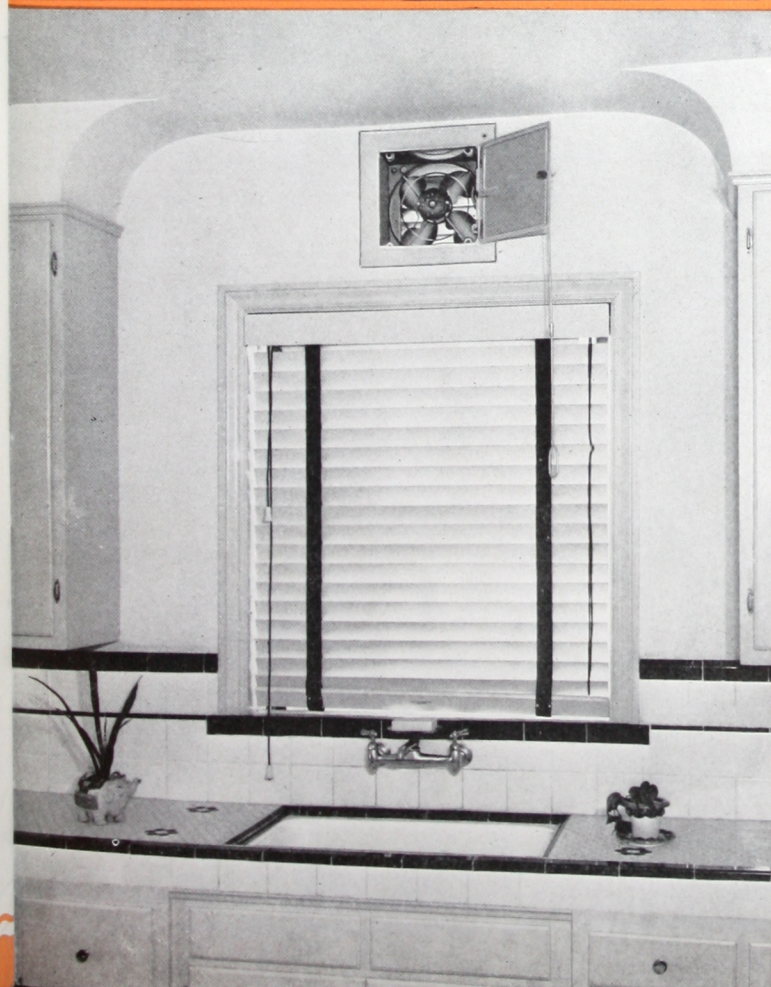
Inside panels drilled with all necessary holes for mounting and are furnished complete with screws, etc.

$\frac{1}{4}$ " opening is provided in each side of box for bringing in line leads.

\*Extra-long, threaded studs for thicker walls furnished on request. No. 2 studs

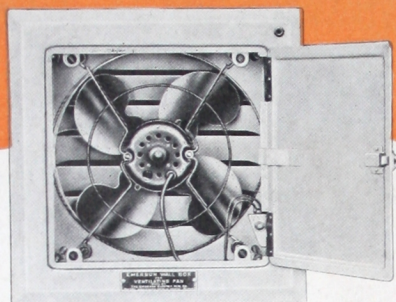
give maximum wall thickness of 16" for 9-inch wall box and 17" for 12-inch wall box. No. 3 studs give maximum wall thickness of 22" for 9-inch wall box and 23" for 12-inch wall box.

Each box furnished with outlet box and handle for opening and closing door.

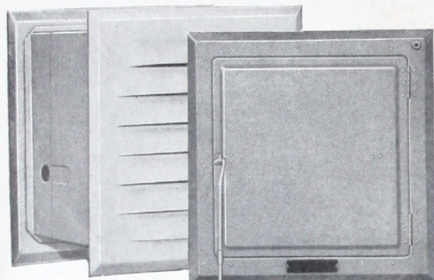


# EMERSON-Seabreeze Ventilating Fans

The Low-Priced Companion Line to EMERSON-ELECTRIC  
Ventilating Fans for Low Cost Installation  
and Speculative Building



Emerson-Seabreeze 12-inch Kitchen Ventilating Fan in wall box viewed with door open. Approved by Underwriters.



Outside view of Emerson-Seabreeze Wall Box showing permanent louvers that protect against the elements.

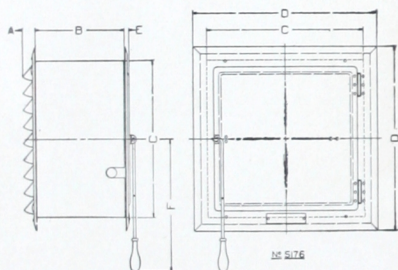
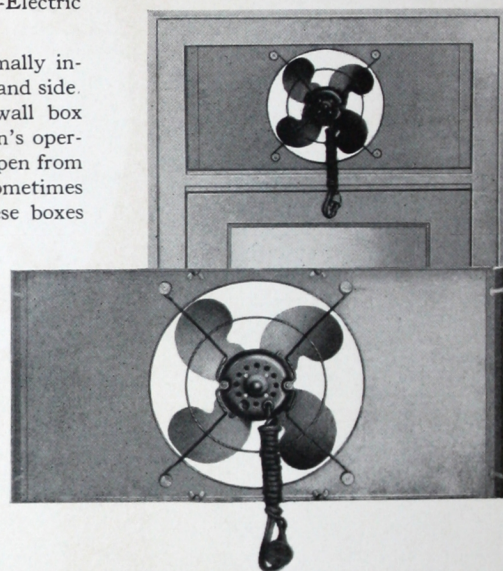
Inside view with door closed.

Embodying many of the outstanding features of Emerson-Electric Ventilating Fans, although motors are non-reversible, Emerson-Seabreeze Ventilating Fans are ideally suited for speculative builders and for low-cost, large-scale housing developments. Motors are rubber mounted to eliminate vibration. Panels and wall boxes are finished in a handsome durable French Gray Lacquer, easily washed.

Emerson-Seabreeze Ventilating Fans in wall boxes are easily installed in homes under construction or those already completed. Wall boxes are equipped with jamb switch, starting and stopping the motor when the door is opened and closed. Wall boxes are adjustable to wall thickness and extra-long, threaded studs will be furnished on request for walls of unusual thickness. Ideal for low-cost kitchen ventilation, Emerson-Seabreeze Ventilating Fans are a worthy companion line for Emerson-Electric Ventilating Fans.

Emerson-Seabreeze Wall Boxes are normally installed with door opening from the left-hand side. By rotating the inner section of the wall box (which in no way interferes with the fan's operation), the door will be placed so as to open from the right-hand side, a convenience sometimes necessary in certain installations. These boxes embody all features of design and construction the same as boxes supplied for Emerson-Electric Ventilating Fans.

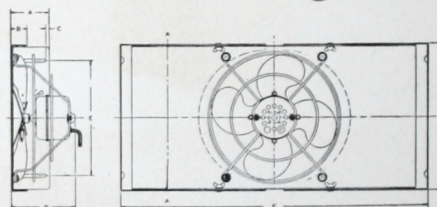
Illustration at right shows Emerson-Seabreeze Ventilating Fan in adjustable metal mounting panel installed in door transom. Equipped with rubber-covered cord and soft-rubber plug. Mounting panels adjustable for windows or transoms from 23 to 37 inches in width.



Wall Box Dimension Diagram

Type	A	*B	C	D	E	F
3350-AA	1 1/8"	8" to 14"	11 1/8"	13 1/2"	3/8"	27 3/4"
3360-AA	1 1/8"	8" to 15"	14 1/8"	16 1/2"	3/8"	27 3/4"

\*Extra-long, threaded studs for thicker walls furnished on request. No. 2 studs give maximum wall thickness of 16" for 10-inch wall box and 17" for 12-inch wall box. No. 3 studs give maximum wall thickness of 22" for 10-inch wall box and 23" for 12-inch wall box.



Panel and Fan Dimension Diagram

Type	A	B	C	D	E	F	G
3350-B	3"	1 1/4"	1/4"	4 3/4"	9"	11 1/2"	23" to 36"
3360	4"	1 5/8"	3/8"	6 1/4"	11 3/4"	14 1/4"	27" to 37"

## Emerson-Seabreeze Ventilators With Metal Mounting Panels. One-Year Guarantee.

Type No.	Size Inches	Volts	Cycles	Performance	Approx. *CFM Free Air	Adjustable	Weight Lbs.		Code Word	List Price Each
							Net	Pkd.		
3350-B	10	115	60	1500 rpm—37 watts	570	23" to 36"	10	13	JOLIT	\$ 8 45
3360	12	115	60	1575 rpm—46 watts	875	27" to 37"	18	25	JONOX	14. 95
★Emerson-Seabreeze Ventilators With Wall Boxes										
3350-AA	10	115	60	1500 rpm—37 watts	570	8" to 14"	28 1/2	30	JESAW	\$22. 45
3360-AA	12	115	60	1575 rpm—46 watts	875	8" to 15"	42	46	JOKOT	30. 95

\*CFM—Cubic feet of air per minute. ‡Fans packed separately from panels and wall boxes.

★Approved by Underwriters.

**THE EMERSON ELECTRIC MFG. CO. • ST. LOUIS, MO.**  
NEW YORK CHICAGO DETROIT DAVENPORT